A1 only

7. (Amended) A cell as claimed in claim 1, characterized in that the membrane receptor is a non-naturally occurring, synthetic membrane receptor.

A2

9. (Amended) A cell as claimed in claim 1, characterized in that the ligand-binding section comprises the ligand-binding section of a transmembrane receptor, of a G-protein-coupled receptor, of a 7-transmembrane receptor, of an odor receptor (or olfactorial receptor) or of a nuclear receptor, or is derived from the latter.

A3

11. (Amended) A cell as claimed in claim 1, characterized in that the mediator section comprises the cytoplasmic part of a G-protein-coupled receptor, sections thereof or an amino acid sequence derived therefrom.

A4

15. (Amended) A cell as claimed in claim 12, characterized in that the effector section of the fusion protein comprises the sequence of an active Ras protein.

A5

18. (Amended) A cell as claimed in claim 1, characterized in that the mediator section is able, as a result of the ligand binding or, alternatively, lack of ligand binding to the ligand-binding section, to bind one or more adaptor proteins via which the effector protein or polypeptide which is capable of activating a Ras or Ras-like signal pathway in the cell, in the form of a fusion protein of an effector section with an adaptor protein or polypeptide section which makes binding possible to the component of the membrane via one or more of the adaptor proteins, can bind to the mediator section.

24. (Amended) A cell as claimed in claim 22, characterized in that the separate receptor-specific enzyme is a kinase and, in particular a tyrosine kinase.

A6

25. (Amended) A cell as claimed in claim 18, characterized in that the adaptor proteins Gbr2 or Shc can be bound by the mediator section as a result of the ligand binding or, alternatively, lack of ligand binding to the ligand-binding section.

26. (Amended) A cell as claimed in claim 1, characterized in that the cell is a prokaryotic or eukaryotic cell.

28. (Amended) A cell as claimed in claim 1, characterized in that it is applied to a solid carrier.

30. (Amended) A cell as claimed in claim 1, characterized in that in the absence of the membrane receptor at least under certain conditions a Ras or Ras-like signal pathway in the cell cannot be activated.

34. (Amended) A cell as claimed in claim 31, characterized in that the lack of activatability of the Ras or Ras-like signal pathway in the absence of the membrane receptor above a particular temperature is derived from at least one mutation of a Ras protein intrinsic to the cell, which has the effect that the latter is incapable of functioning above the particular temperature.

35. (Amended) A *in vivo* assay for determining the suitability of a test substance as ligand for a ligand-binding section of a receptor, characterized by the following steps:

(a) contacting the test substance with cells as claimed in claim 30 under conditions with which a Ras or Ras-like signal pathway in the cell cannot be activated in the absence of the membrane receptor, where the membrane receptor contains said ligand-binding section, and the effector protein or polypeptide whose binding to a membrane component depends on the binding of a ligand to the ligand-binding section of the membrane receptor, as defined in claim 30, is able to activate this Ras or Ras-like signal pathway,

(b) investigating whether activation of the Ras of Ras-like signal pathway has taken place, where detection of the activation of the Ras or Ras-like signal pathway indicates the ability of the test substance to bind to the ligand-binding section.

38. (Amended) A *in vivo* assay for determining the suitability of a test substance as ligand for a ligand-binding section of a receptor, characterized by the following steps:

(a) contacting the test substance with cells as claimed in claim 30 under

conditions with which a Ras or Ras-like signal pathway in the cell cannot be activated in the absence of the membrane receptor, where the membrane receptor contains said ligand-binding section, and the effector protein or polypeptide whose binding to a membrane component depends on the lack of binding of a ligand to the ligand-binding section of the membrane receptor, as defined in claim 30, is able to activate this Ras or Ras-like signal pathway,

(b) investigating whether activation of the Ras of Ras-like signal pathway has taken place,

(c) investigating cells employed in step (a) under conditions with which the Ras or Ras-like signal pathway in the cell cannot be activated in the absence of the membrane receptor, for activation of the Ras or Ras-like signal pathway in the absence of the test substance, where detection of the activation of the Ras or Ras-like signal pathway in the absence of the test substance and the inactivity of the Ras or Ras-like signal pathway in the presence of the test substance indicates the ability of the test substance to bind to the ligand-binding section.

39. (Amended) An assay as claimed in claim 35, characterized in that the test substance is a naturally occurring substance and, in particular, an odorant, flavoring, peptide, peptide hormone, protein, in particular cytokine, growth factor, neurotransmitter, non-protein- or -peptide-like hormone and/or a vitamin.

40. (Amended) An assay as claimed in claim 35, characterized in that the test substance is a non-naturally occurring substance and, in particular, a synthetic derivative of a natural ligand or a poison, in particular dioxin.

42. (Amended) A screening method for unknown ligands of a particular receptor, characterized in that an assay method as claimed in claim 35 is employed for the screening.

43. (Amended) A *in vivo* assay for determining the detecting the presence of a ligand for a ligand-binding section of a receptor in a sample which possibly contains the latter, characterized by the following steps:

(a) contacting the sample with cells as claimed in claim 30 under conditions with which a Ras or Ras-like signal pathway in the cell cannot be activated in the absence of the membrane receptor, where the membrane receptor contains said ligand-binding section, and the effector protein or polypeptide whose binding to a membrane component depends on the binding of a ligand to the ligand-binding section of the membrane receptor, as defined in claim 30, is able to activate this Ras or Ras-like signal pathway,

(b) investigating whether activation of the Ras of Ras-like signal pathway has taken place, where detection of the activation of the Ras or Ras-like signal pathway indicates the presence of a ligand for the ligand-binding section of a receptor in the sample.

---

46. (Amended) A *in vivo* assay for determining the presence of a ligand for a ligand-binding section of a receptor in a sample which possibly contains the latter, characterized by the following steps:

(a) contacting the sample with cells as claimed in claim 30 under conditions with which a Ras or Ras-like signal pathway in the cell cannot be activated in the absence of the membrane receptor, where the membrane receptor contains said ligand-binding section, and the effector protein or polypeptide whose binding to a membrane component depends on the lack of binding of a ligand to the ligand-binding section of the membrane receptor, as defined in claim 30, is able to activate this Ras or Ras-like signal pathway,

(b) investigating whether activation of the Ras of Ras-like signal pathway has taken place,

(c) investigating cells employed in step (a) under conditions with which the Ras or Ras-like signal pathway in the cell cannot be activated in the absence of the membrane receptor, for activation of the Ras or Ras-like signal pathway in the absence of the sample, where detection of the activation of the Ras or Ras-like signal pathway in the absence of the sample and the inactivity of the Ras or Ras-like signal pathway in the presence of the sample indicates the presence of a ligand for the ligand-binding section of a receptor in the sample.

47. (Amended) A screening method for unknown ligands of a particular receptor in a sample, characterized in that an assay method as claimed in claim 43 is employed for the screening.

48. (Amended) A *in vivo* assay for the quantitative determination of the concentration of a ligand for a ligand-binding section of a receptor in a sample which contains the latter, characterized by the following steps:

(a) contacting an aliquot of the sample with cells as claimed in claim 30 under conditions with which a Ras or Ras-like signal pathway in the cell cannot be activated in the absence of the membrane receptor, where the membrane receptor contains said ligand-binding section, and the effector protein or polypeptide whose binding to a membrane component depends on the binding of a ligand to the ligand-binding section of the membrane receptor, as defined in claim 30, is able to activate this Ras or Ras-like signal pathway,

(b) detecting quantitatively the extent of the activation of the Ras or Ras-like signal pathway by direct or indirect means,

(c) measuring the concentration of the ligand in the sample by comparing the measured extent of activation with corresponding values measured for known standard concentrations of the ligand.

51. (Amended) A *in vivo* assay for determining whether a compound is able to alter a binding activity of a ligand-binding section of a receptor in relation to a ligand, characterized by the following steps:

(a) contacting the ligand in the presence of the compound with cells as claimed in any of claim 30 under conditions with which in the absence of the membrane receptor the Ras or Ras-like signal pathway in the cells cannot be activated, where the membrane receptor contains said ligand-binding section, and the effector protein or polypeptide whose binding to a membrane component depends on the binding of or, alternatively, the lack of binding of a ligand to the ligand-binding section of the membrane receptor, as defined in claim 30, is able to activate this Ras or Ras-like signal pathway,

(b) investigating whether and, where appropriate, to what extent activation of the Ras of Ras-like signal pathway takes place,

(c) comparing the result of the investigation in step (b) with a result of an investigation obtained when the assay is carried out in the absence of the compound.

55. (Amended) A *in vivo* assay for detecting whether a polypeptide or protein has a ligand-binding function of a receptor, characterized by the following steps:

(a) contacting cells as claimed in claim 30 with the ligand under conditions with which in the absence of the membrane receptor, defined in claim 30, a Ras or Ras-like signal pathway in the cells cannot be activated, where the ligand-binding section of the membrane receptor comprises the polypeptide or protein to be investigated or consists thereof, and where the effector protein or polypeptide whose binding to a membrane component depends on the lack of binding of a ligand to the ligand-binding section of the membrane receptor, is able to activate the inactive Ras or Ras-like signal pathway,

(b) investigating whether an activation of the Ras of Ras-like signal pathway has taken place, where detection of the activation of the Ras or Ras-like signal pathway indicates that the ligand-binding section of the membrane receptor and, accordingly, the polypeptide or protein to be investigated has a ligand-binding function of a receptor.

57. (Amended) An assay as claimed in claim 55, where step (b) comprises detecting the activation of the Ras or Ras-like signal pathway via reporter gene expression which takes place where appropriate and only because of the activation, resulting from the activation of the Ras or Ras-like signal pathway, of a specific transcription factor, where detection of the expression of the reporter gene indicates the ligand-binding function of the ligand-binding section of the membrane receptor and, accordingly, of the polypeptide or protein to be investigated.

58. (Amended) An assay as claimed in claim 55, where in step (a) cells in which the inactive or inactivatable Ras or Ras-like signal pathway is a signal pathway which acts on the cell cycle and whose activation is essential for cell reproduction are employed, and step (b) comprises investigating whether the cells are capable of reproduction under said conditions, where detection of the ability of the cells to reproduce indicates the ligand-binding function of the ligand-binding section of the membrane receptor and, accordingly, of the polypeptide or protein to be investigated.

59. (Amended) A *in vivo* assay for determining whether a polypeptide or protein has ligand-binding function of a receptor, characterized by the following steps:

(a) contacting the cells as claimed in claim 30 with the ligand under conditions with which in the absence of the membrane receptor, as defined in claim 30, a Ras or Ras-like signal pathway in the cells cannot be activated, where the ligand-binding section of the membrane receptor comprises the polypeptide or protein to be investigated or consists thereof, and where the effector protein or polypeptide whose binding to a membrane component depends on the lack of binding of a ligand to the ligand-binding section of the membrane receptor, is able to activate the inactive Ras or Ras-like signal pathway,

(b) investigating whether an activation of the Ras of Ras-like signal pathway has taken place,

(c) investigating cells as employed in step (a) under conditions with which the Ras or Ras-like signal pathway in the cell cannot be activated in the absence of the membrane receptor, for activation of the Ras or Ras-like signal pathway in the absence of ligands, where a detection of the activation of the Ras or Ras-like signal pathway in the absence of the ligand and the inactivity of the Ras or Ras-like signal pathway in the presence of the ligand indicates that the ligand-binding section of the membrane receptor and, accordingly, the polypeptide or protein to be investigated has a ligand-binding function of a receptor.

60. (Amended) A kit for use in an assay as claimed in claim 35, which comprises cells as claimed in claim 35.

61. (Amended) A kit for use in an assay as claimed in claim 35, which comprises components (a) and (b) indicated below and, where appropriate, additionally one or both of components (c) and (d) indicated below:

(a) cells in which at least under certain conditions a Ras or Ras-like signal pathway cannot be activated;

(b) a nucleic acid vector into which is expressibly inserted a DNA sequence which encodes a membrane receptor, as defined in claim 35, where the effector protein or polypeptide whose binding to a membrane component depends on the binding or, alternatively, lack of binding of ligand to the ligand-binding section of the membrane receptor

is able to activate the inactive Ras or Ras-like signal pathway in the cells mentioned under (a);

(c) a nucleic acid vector into which is expressibly inserted a DNA sequence which encodes the effector protein or polypeptide which, in the event of ligand binding or, alternatively, lack of ligand binding to the ligand-binding to the ligand-binding section of the membrane receptor, is able to bind to a component of the membrane, where appropriate via other proteins or polypeptides (adaptors), and which is in the form of a fusion protein of an effector section with an adaptor protein or polypeptide which makes binding possible to the component of the membrane, where appropriate via other proteins or polypeptides (adaptors);

(d) a nucleic acid vector into which is expressibly inserted a DNA sequence which encodes at least one adaptor protein, via which the effector protein or polypeptide is able, when there is binding or, alternatively, lack of binding of a ligand to the ligand-binding section of the membrane receptor, to bind to a component of the membrane.

62. (Amended) A kit for use in an assay as claimed in claim 35, which comprises components (a) and (b) indicated below and, where appropriate, additionally one or both of components (c) and (d) indicated below:

(a) cells in which a Ras or Ras-like signal pathway cannot be activated at least under certain conditions;

(b) a nucleic acid vector which comprises, in suitable arrangement;

- a DNA section which encodes a membrane-localization signal of a membrane receptor, as defined in claim 35;
- a DNA section which encodes a mediator section of a membrane receptor, as defined in claim 35; and
- a suitably arranged insertion site for functional insertion of a DNA sequence which encodes a ligand-binding section, as defined in claim 35, where, after insertion of a DNA sequence for the ligand-binding section, the nucleic acid vector comprises a complete expressible gene for a membrane receptor, as defined in claim 35, where the effector protein or polypeptide whose binding to a membrane component depends on the binding or, alternatively, lack of binding of a ligand to the ligand-binding section of the membrane receptor is able to activate the inactive Ras or Ras-like signal pathway in the cells mentioned

under (a);

(c) a nucleic acid vector into which is expressibly inserted a DNA sequence which encodes the effector protein or polypeptide which, in the event of ligand binding or, alternatively, lack of ligand binding to the ligand-binding section of the membrane receptor, is able to bind to a component of the membrane, where appropriate via other proteins or polypeptides (adaptors), and which is in the form of a fusion protein of an effector section with an adaptor protein or polypeptide which makes binding possible to the component of the membrane, where appropriate via other proteins or polypeptides (adaptors);

(d) a nucleic acid vector into which is expressibly inserted a DNA sequence which encodes at least one adaptor protein, via which the effector protein or polypeptide is able, when there is binding or, alternatively, lack of binding of a ligand to the ligand-binding section of the membrane receptor, to bind to a component of the membrane.

63. (Amended) A kit for use in an assay as claimed in claim 55, which comprises cells as claimed in claim 55, where the membrane receptor, as defined in claim 55, present therein comprises a ligand-binding section comprising or consisting of a polypeptide or protein suspected of having a ligand-binding function of a receptor.

64. (Amended) A kit for use in an assay as claimed in claim 55, which comprises components (a) and (b) indicated below and, where appropriate, additionally one or both of components (c) and (d) indicated below:

(a) cells in which a Ras or Ras-like signal pathway cannot be activated at least under certain conditions;

(b) a nucleic acid vector into which is expressibly inserted a DNA sequence which encodes a membrane receptor, as defined in claim 55, where the ligand-binding section of the membrane receptor comprises a polypeptide or protein suspected of having a ligand-binding function of a receptor, or is formed therefrom, and the effector protein or polypeptide whose binding to a membrane component depends on the binding or, alternatively, lack of binding of a ligand to the ligand-binding section of the membrane receptor is able to activate the inactive Ras or Ras-like signal pathway in the cells mentioned under (a);

(c) a nucleic acid vector into which is expressibly inserted a DNA sequence which

encodes the effector protein or polypeptide which, in the event of ligand binding or, alternatively, lack of ligand binding to the ligand-binding section of the membrane receptor, is able to bind to a component of the membrane, where appropriate via other proteins or polypeptides (adaptors), and which is in the form of a fusion protein of an effector section with an adaptor protein or polypeptide which makes binding possible to the component of the membrane, where appropriate via other proteins or polypeptides (adaptors);

(d) a nucleic acid vector into which is expressibly inserted a DNA sequence which encodes at least one adaptor protein, via which the effector protein or polypeptide is able, when there is binding or, alternatively, lack of binding of a ligand to the ligand-binding section of the membrane receptor, to bind to a component of the membrane.

65. (Amended) A kit for use in an assay as claimed in claim 55, which comprises components (a) and (b) indicated below and, where appropriate, additionally one or both of components (c) and (d) indicated below:

(a) cells in which a Ras or Ras-like signal pathway cannot be activated at least under certain conditions;

(b) a nucleic acid vector which comprises, in suitable arrangement;

- a DNA section which encodes a membrane-localization signal of a membrane receptor, as defined in claim 55;

- a DNA section which encodes a mediator section of a membrane receptor, as defined in claim 55; and

- a suitably arranged insertion site for functional insertion of a DNA sequence which encodes a polypeptide or protein suspected of having a ligand-binding function of a receptor, where, after insertion of a DNA sequence for the ligand-binding section, the nucleic acid vector comprises a complete expressible gene for a membrane receptor, where the effector protein or polypeptide whose binding to a membrane component depends on the binding or, alternatively, lack of binding of a ligand to the ligand-binding section, formed from the polypeptide or protein suspected of having a ligand-binding function of a receptor, of the membrane receptor is able to activate the inactive Ras or Ras-like signal pathway in the cells mentioned under (a);

(c) a nucleic acid vector into which is expressibly inserted a DNA sequence which

encodes the effector protein or polypeptide which, in the event of ligand binding or, alternatively, lack of ligand binding to the ligand-binding section of the membrane receptor, is able to bind to a component of the membrane, where appropriate via other proteins or polypeptides (adaptors), and which is in the form of a fusion protein of an effector section with an adaptor protein or polypeptide which makes binding possible to the component of the membrane, where appropriate via other proteins or polypeptides (adaptors);

(d) a nucleic acid vector into which is expressibly inserted a DNA sequence which encodes at least one adaptor protein, via which the effector protein or polypeptide is able, when there is binding or, alternatively, lack of binding of a ligand to the ligand-binding section of the membrane receptor, to bind to a component of the membrane.

66. (Amended) A kit as claimed in claim 60, in which the cells additionally contain a construct comprising a binding site for a transcription factor whose activation results from an activation of a specific Ras or Ras-like signal pathway whose activation is to be detected by the assay, a minimal promoter and a reporter gene functionally linked thereto, where the minimal promoter is activated as a result of binding of the activated transcription factor to its binding site.

67. (Amended) A kit as claimed in claim 60, characterized in that it additionally contains a transformation or transfection vector with a construct comprising a binding site for a transcription factor whose activation results from an activation of a specific Ras or Ras-like signal pathway whose activation is to be detected by the assay, a minimal promoter and a reporter gene functionally linked thereto, where the minimal promoter is activated transcription factor to its binding site.

68. (Amended) A kit as claimed in claim 60, characterized in that it additionally contains a transformation or transfection vector with a construct comprising a binding site for a transcription factor comprising a binding site for a transcription factor whose activation results from an activation of a specific Ras or Ras-like signal pathway whose activation is to be detected by the assay, a minimal promoter and an insertion site, suitably arranged for expression controlled by the minimal promoter, for insertion of a reporter gene, where the

minimal promoter is activated as a result of a binding of the activated transcription factor to its binding site.

69. (Amended) A kit as claimed in claim 60, which contains the cells immobilized or enclosed in microchambers of a solid carrier, in particular on biochips.

70. (Amended) A method for identifying polypeptides or proteins, in particular receptors, which have a ligand-binding function of a receptor, which comprises:

-preparing a cell as claimed in claim 1 with a membrane receptor having the features described in claim 1 and comprising the whole of such a polypeptide or protein or a part of such a polypeptide or protein which presumably contains the sequence sections essential for the ligand-binding function, and

-using this cell to carry out an *in vivo* assay method for detecting whether a polypeptide or protein has a ligand-binding function of a receptor, as claimed in claim 1.